CONTENTS

Preface vii

Conference information viii

Contents ix

Chapter 1. Magnet technology

D.C. laboratory electromagnets
H.-J. Schneider-Muntau 3

Design of magnet coils for semi-continuous magnetic fields up to 60 T
R. Gersdorf, L.W. Roeland and W.C.M. Mattens 10

Experiments with strong pulsed magnetic fields produced by Cu/Nb microcomposite wire-wound magnets
S. Foner 18

Production of ultra-high magnetic fields and their application to solid state physics
N. Miura, T. Goto, K. Nakao, S. Takeyama, T. Sakakibara, T. Haruyama and T. Kikuchi 23

Laboratory facility for the magnetic flux compression systems using large explosives
G.A. Shvetsov 33

Production of repeating pulsed high magnetic field
M. Motokawa, H. Nojiri, J. Ishihara and K. Ohnishi 39

An electronic monitoring system for hybrid magnets
M. Hafendörfer, H.-J. Schneider-Muntau and J.C. Vallier 43

Switching of a 0.5-MJ capacitor bank with thyristors at surge ratings
G. Heremans, L. Van Bockstal and F. Herlach 48

Workshop on magnet technology
H. Jones (Chairman) 51

Chapter 2. Magnet laboratory facilities

Non-destructive quasi-static pulsed magnetic fields at Toulouse
S. Askenazy, J. Marquez and D. Ricart 55

The 40-T facility of the University of Amsterdam
L.W. Roeland, R. Gersdorf and W.C.M. Mattens 58

The pulsed field installation at the K.U. Leuven
F. Herlach, L. Van Bockstal, M. van der Burgt and G. Heremans 61

The high field facility at the Clarendon Laboratory, Oxford
H. Jones 65

High field laboratory for superconducting materials, Institute for Materials Research, Tohoku University
Y. Nakagawa, K. Noto, A. Hoshi, K. Watanabe, S. Miura, G. Kido and Y. Muto 69

The Nijmegen High Field Magnet Laboratory
J.A.A.J. Perenboom and K. van Hulst 74

The Francis Bitter National Magnet Laboratory at MIT: 1988 status
L.G. Rubin, R.J. Weggel, M.J. Leupold, B.L. Brandt, J.E.C. Williams and Y. Iwasa 78

The High Field Magnet Laboratory of Grenoble
H.W.H.M. Jongbloets, H.-J. Schneider-Muntau, J.C. Picoche, P. Rub and J.C. Vallier 81

High field magnets at the International Laboratory Wroclaw
K. Trojnar and N. Koppetzki 85

A 20-T superconducting magnet system
P. Turowski and Th. Schneider 87

High magnetic field facility at Osaka University
A. Yamagishi and M. Date 91

An idea for the easy construction of a high field magnet
M. Motokawa, H. Nojiri and Y. Tokunaga 96

The development of compact 18-T filamentary superconducting magnets
F.J. Brown 100

The high field magnet laboratory (HMFA) at Braunschweig University
W. Gey and H. Simontowski 104

Megagauss Laboratory in Tokyo
N. Miura, T. Goto, K. Nakao, S. Takeyama, T. Sakakibara, T. Haruyama and T. Kikuchi 106

High-field research in China
F.m. Yang, R.w. Zhao and B.j. Gao 111

Advances in high field magnetism at Osaka
M. Date 119

Chapter 3. Superconductivity

Status and prospects of superconducting Chevrel phase wires for high magnetic field applications
B. Seeber, M. Decroux and Ø. Fischer 129

Irreversible magnetization and upper critical field of $YBa_2Cu_3O_7$ single crystals in high magnetic fields
K. Kadowaki, L.W. Roeland, P.H. Kes, J.-N. Li, A.A. Menovsky, Y.-K. Huang, J. van den Berg, C.J. van der Beek, M.J.V. Menken and F.R. de Boer 136

High magnetic field properties of $ErBa_2Cu_3O_7$ and $HoBa_2Cu_3O_7$ single crystals
M. Guillot, J.L. Tholence, A. Marchand, G. Chouteau, M. Potel, P. Gougeon, H. Noel and J.C. Levet 140

The measurement of critical currents of high T_c superconductors in magnetic fields
L. Cowey, H. Jones and D. Dew-Hughes 145

Critical parameters of high T_c compounds
C. Van Haesendonck, J.-P. Locquet, I.K. Schuller and Y. Bruynseraede 149

Magnetic measurements of high T_c superconductors in megagauss fields
K. Nakao, N. Miura, K. Tatsuhara, S. Uchida, H. Takagi, T. Wada, S. Tanaka, H. Takeya and F. Takei 156

Anisotropy of the critical fields of high-T_c superconductors
P.J.M. van Bentum, H. van Kempen, J.A.A.J. Perenboom, L.W.M. Schreurs, P.A.A. Teunissen and H.J.L. van der Steen 160

High field properties and characteristics of oxide superconductors
Y. Ikenu, K. Gotoh, A. Kume, M. Nakagawa and O. Kohno 164

Critical field of high T_c superconductors
W. Boon, J.-P. Locquet, M. D'Halle, J. Vanacken, C. Van Haesendonck, I.K. Schuller and Y. Bruynseraede 167

H_{c2} measurement of high T_c superconductors by pulsed magnetic field
F. Bolzoni 170

High field measurements of whole profile of H_{c2} and normal resistivity of high-T_c single crystal superconductors
A. Yamagishi, H. Fuke, K. Sugiyama, M. Date, Y. Tajima and M. Hikita 174

The effect of Y substitution by lanthanides on J_c of $Ba_2Y_1Cu_3O_{7-\delta}$
H. Morita, Y. Murakami, Y. Koyanagi, K. Watanabe, K. Noto and H. Fujimori 178

Magnetization and critical currents in high-T_c superconducting oxides
S. Noguchi, K. Okuda, K. Sugiyama, A. Yamagishi and M. Date 182

Upper critical field measurements in high-T_c superconducting oxides
J.C. Ousset, J.F. Bobo, J.P. Ulmet, N. Cheggour and H. Rakoto 186

Technique for contactless transport measurement in very high magnetic fields – a challenge to determine $H_{c2}(0)$ of high-T_c superconductors in the megagauss range
T. Sakakibara, T. Goto and N. Miura 189

FIR paramagnetic resonance in high-T_c superconductors
L. Van Bockstal, K. Johannik, L. De Vrindt, F. Herlach and P. de Groot 193

Chapter 4. d-magnetism

High field magnetostriction in intermetallic compounds
G. Kido 199

Metamagnetic properties in $Lu(Co_{1-x}Al_x)_2$ by magnetization and magnetostriction
M. Iijima, K. Endo and G. Kido 203

High magnetic field effect in martensitic transformation
K. Kindo, K. Hazumi, T. Kakeshita, K. Shimizu, H. Hori and M. Date 207

On the paramagnetic behaviour of Fe in $Y(Fe,Al)_2$
A. Pösinger, M. Reissner and W. Steiner 211

Magnetic transitions in θ-$Mn_{11}Ge_8$ and ζ_1-$Mn_{2.6}Ge$
N. Yamada, K. Nakao, T. Goto and T. Ohoyama 215

Chapter 5. f-magnetism

High-field magnetization of ternary uranium 1:1:1 intermetallics
F.R. de Boer, E. Brück, A.A. Menovsky, P.A. Veenhuizen, V. Sechovsky, L. Havela and K.H.J. Buschow 221

Magnetization of some rare earth and actinide compounds in high magnetic fields
A.S. Lagutin 225

f-electron systems in high magnetic fields
W. Suski 229

High-magnetic-field experiments in heavy-fermion systems
J.J.M. Franse 236

Properties of $U_xY_{1-x}As$ in high magnetic fields
T. Palewski and T. Mydlarz 245

Anomalous step-magnetization of GdB_6 in high magnetic fields
K. Sugiyama and M. Date 249

Field-induced metallic state of YbB_{12} in high magnetic fields
K. Sugiyama and M. Date 253

Chapter 6. R–T intermetallics

Hall effect in a RE-TM perpendicular magnetic anisotropy film under pulsed high magnetic fields
K. Okamoto and N. Miura 259

High pulsed magnetic field measurements of the magnetic anisotropy in $(Er_xDy_{1-x})_2Fe_{14}B$ compounds
P.A. Algarabel, M.R. Ibarra, C. Marquina, G. Marusi, O. Moze, L. Pareti, M. Solzi, J.I. Arnaudas and A. del Moral 263

Field induced transition from collinear to canted magnetic structures in $TbCo_5$
R. Ballou, B. Gorges, R. Lemaire, H. Rakoto and J.C. Ousset 266

High-field magnetization of $Pr_2Fe_{14}B$-based compounds
Z.-D. Zhang, Y.-K. Huang, X.K. Sun, Y.C. Chuang, F.m. Yang, F.R. de Boer and R.J. Radwanski 269

Transverse magnetoresistance of $Ho_xCo_{70-x}B_{30}$ amorphous ribbons
P. Czarnecki, B. Idzikowski and A. Wrzeciono 273

Magnetization and high field magneto-resistance in $SmCu_2$
K. Maezawa, S. Wakabayashi, K. Sato, Y. Isikawa, T. Kaneko, G. Kido and Y. Nakagawa 276

Magnetization of $Nd_2Fe_{14}B$-type compounds in high magnetic fields
Y. Nakagawa, G. Kido, M. Yamada, H. Kato, H. Hiroyoshi, N. Saito, D.W. Lim, S. Hirosawa and M. Sagawa 279

Chapter 7. Transition metal compounds

Spin-flip transition of YIG observed in megagauss fields
T. Goto, K. Nakao and N. Miura 285

Magnetic measurements of polynuclear metal cluster compounds between molecule and metal
L.J. de Jongh 289

Faraday rotation of antiferromagnets in megagauss fields produced by single turn coils
M. Motokawa, T. Sakakibara, T. Goto and N. Miura 296

Magnetization of $CsFeCl_3$ in high magnetic field; a new phase transition between different spin multiplets
H. Hori, I. Shiozaki, M. Chiba, T. Tsuboi and M. Date 299

High field magnetization processes in $Mn_{1-x}Cr_xAs$
K. Sugiyama, I. Shiozaki, H. Ido and M. Date 303

High field magnetization of single crystals YFe_2O_4, $YbFe_2O_4$ and $LuFe_2O_4$
J. Iida, S. Kakugawa, G. Kido, Y. Nakagawa, S. Takekawa and N. Kimizuka 307

Effect of magnetic fields on reentrant-spin-glass $Fe_xMn_{1-x}TiO_3$ ($x = 0.60$, 0.65 and 0.75)
H. Aruga, A. Ito, H. Wakabayashi and T. Goto 311

Observation of a first-order transition at $T < T_c$ in MnV_2O_4
R. Plumier and M. Sougi 315

Chapter 8. Spin resonances

Magnetic excitations in random systems in high magnetic fields
J. Tuchendler and K. Katsumata 323

Far infrared paramagnetic resonances in DyAl garnet
P. Janssen and W.P. Wolf 328

Ferromagnetic resonance in 3d metals at high magnetic fields
L. Van Bockstal, J. Dekoster, F. Herlach and J. Witters 332

On the EPR of $3d^4$ and $3d^6$ ions at high magnetic fields
C. Rudowicz 336

Submillimeter wave ESR of $CsFeCl_3$ in a pulsed high magnetic field
M. Motokawa, H. Ohta, K. Fukuda, N. Kitamura, T. Hirano and K. Yamazaki 340

Chapter 9. Semiconductors

A fraction of the fractional quantum Hall effect
G.S. Boebinger 347

Quasi-static pulsed high magnetic field used to study magnetic properties of semimagnetic semiconductors
J.P. Lascaray, A. Bruno, J.C. Ousset, H. Rakoto, J.M. Broto and S. Askenazy 353

Conductivity in a spin-polarized band near the metal–insulator critical point
T. Wojtowicz, M. Sawicki, J. Jaroszyński, T. Dietl and W. Plesiewicz 357

Magnetoresistance measurements on the magnetic semiconductor $Nd_{0.5}Pb_{0.5}MnO_3$
R.M. Kusters, J. Singleton, D.A. Keen, R. McGreevy and W. Hayes 362

Chapter 10. Theory

Metamagnetic transition of intermetallic Co compounds under high magnetic fields
H. Yamada and M. Shimizu 369

Phase diagram of a quenched bond-diluted double-bulk Potts ferromagnet
E.L. Albuquerque, E.F. Sarmento and C. Tsallis 372

Magnetic phase transition in $RbFeCl_3$-type magnets under high magnetic fields along the *c*-axis
N. Suzuki and Y. Tagawa 375

Magnetization curves in the ground state of spin-1/2 antiferromagnetic XXZ chains with competing interactions
T. Tonegawa and I. Harada 379

Spectral shift and excited state exchange fields in high magnetic fields
H. Hori and M. Date 383

Chapter 11. Measuring techniques

Sensitive magnetometer available to 10^{-4} emu using pulsed magnet
K. Yamada and M. Okabe 389

A neutron diffraction system for studies in pulsed high magnetic fields
R. Grössinger, G. Badurek, Ch. Gigler and Ch. Schotzko 392

Magnetization measurements in very high pulsed fields produced by a single-turn coil system
K. Amaya, S. Takeyama, T. Nakagawa, M. Ishizuka, K. Nakao, T. Sakakibara, T. Goto, N. Miura, Y. Ajiro and H. Kikuchi 396

The pulsed fields in studies of spinels
J. Juszczyk 400

Determination of the initial value of the magnetization measurement in pulsed high magnetic fields
G. Kido, T. Miyakawa and Y. Nakagawa 403

Automatic device for precise magnetic measurements in high continuous magnetic fields
J.C. Picoche, M. Guillot and A. Marchand 407

A trial of magnetic measurements in explosively condensed fields on MnAs above T_c
K. Kamigaki, S. Miura, T. Kaneko, M. Ohashi, S. Abe and H. Yoshida 411

Chapter 12. Organic and molecular matter

High field magnetoresistance of multilayered structures and organic conductors: weak localization effects
J.C. Ousset, J.P. Ulmet, V. Dupuis and L. Bachere 417

Magnetic properties of liquid oxygen in high magnetic fields
C. Uyeda, A. Yamagishi, H. Hori and M. Date 421

Electric and magnetic properties of an organic ion-radical salt: 3,3′-diethyl-2,2′-selenacyanine-$[TCNQ]_2$
S. Takagi and M. Date 425

Diamagnetic "Curie–Weiss law" and molecular interactions in organic liquids
A. Yamagishi and M. Date 429

Polymerization of biological molecules under high magnetic fields
A. Yamagishi, T. Takeuchi, M. Date and T. Higashi 433

The study of the free radical DPPH in pulsed magnetic fields
W. Boon and L. Van Gerven 437

List of contributors 440

Analytic subject index 442